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Wildlife and Wildlife Habitat

Mitigation Plan for Hungry Horse Hydroelectric Project

September 1984

Prepared by

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PREFACE

The Phase II document describes the proposed mitigation plan to mitigate the impacts to wildlife and wildlife habitat due to construction of the Hungry Horse hydroelectric project in Montana. It discusses preferred mitigation measures as well as options which would provide satisfactory wildlife mitigation. The measures include protection, enhancement and management opportunities developed in accordance with the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (P.L. 96-501) and the Columbia River Basin Fish and Wildlife Program (section 1100) adopted in 1982 by the Northwest Power Planning Council.

This plan specifically addresses mitigation for big game species (elk, mule deer, black bear, grizzly bear); aquatic furbearers (beaver, river otter, mink, muskrat); terrestrial furbearers (pine marten, lynx); mountain grouse (ruffed grouse, blue grouse); waterfowl and bald eagle. It is assumed mitigation for other target species impacted by Hungry Horse Reservoir will occur as secondary benefits.

This document (Phase II) follows the Phase I impact assessment report, which described the estimated wildlife losses attributable to construction of Hungry Horse Dam (Casey et al. 1984). The preparation of the Phase I and II documents was funded by the Bonneville Power Administration (contract No. 83-464).

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I. INTRODUCTION

A. HISTORY

Hungry Horse Dam and Reservoir are located on the South Fork of the Flathead River (South Fork) 5 miles upstream from its confluence with the mainstem of the Flathead River, 7 miles southeast of Columbia Falls, and 11 miles south of the west entrance to Glacier National Park (Fig. 1). This multipurpose project is situated at the top of the Columbia Basin power generating system and is used for both on-site power generation and water storage for downstream power generation. Water released from Hungry Horse Reservoir passes through an additional 19 hydroelectric projects on its way to the ocean. The dam is maintained and operated by the Bureau of Reclamation.

Construction of Hungry Horse Dam was authorized by Congress in 1944 under Public Law 329 (58 Stat. 270) primarily in response to a wartime need for power. The pool area was cleared under a series of logging and clearing contracts initiated during May 1947; all clearing was completed by September 1952. Construction of the dam began in 1948 and the dam was completed during July, 1953. Water storage was initiated in 1951 and the reservoir reached full pool in 1954.

B. RESERVOIR DESCRIPTION

Hungry Horse Dam is 564 feet high and 2115 feet long along the crest. The reservoir is 35 miles long and covers 23,750 acres at full pool. The maximum depth is 500 feet, and maximum storage (to elevation 3560) is 3,468,000 acre-feet. The reservoir lies at the foot of a 1,654-square mile drainage basin, which includes portions of the Bob Marshall and Great Bear Wilderness areas. Lands immediately adjacent to the reservoir are administered by the U.S. Forest Service, Flathead National Forest, including portions of the Hungry Horse and Spotted Bear Ranger Districts.

C. SUMMARY OF WILDLIFE AND HABITAT LOSSES

The reservoir inundated 38.4 miles of the South Fork and associated riparian and aquatic habitats, including diverse habitat features such as islands, gravel bars, sloughs, riparian shrubland, and mixed hardwood/conifer riparian forest (Table 1) (Casey et al. 1984:12). Mature forests of western larch (*Larix occidentalis*), Douglas-fir (*Pseudotsuga menziesii*), western white pine (*Pinus monticola*), and spruce (*Picea spp.*) on the benches and lower slopes were among the forest types logged and cleared from the pool area prior to inundation. Much of the valley had been influenced by fire; regular fires throughout the early part of the

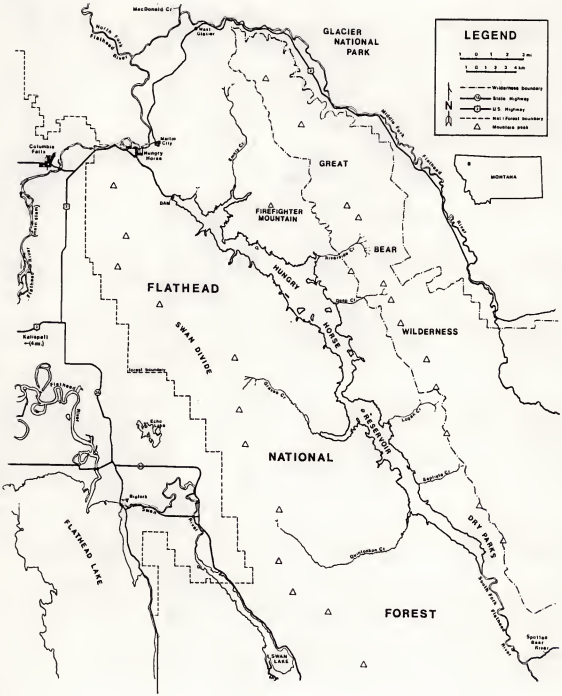


Fig. 1. Location of Hungry Horse Dam and Reservoir.

Table 1. Summary of the Habitat Types inundated by Hungry Horse Reservoir.

Habitat Types	Acres Inundated	Percent of Total
Acquatic		
1a River/Stream	702	3.0
1b Pond/Lake	54	0.2
1c Marsh/Slough	144	0.6
Terrestrial		
2 Gravel Bar	375	1.6
3 Sub-irrigated Grassland	176	0.7
4 Deciduous Shrub Riparian	1,005	4.2
4 Deciduous Tree Riparian	100	0.4
5 Deciduous Tree Riparian	3,555	15.0
7 Upland Grassland:		
7t Terrace Grassland	466	2.0
7 Other	168	0.7
8 Upland Shrub	5,713	24.0
9 Coniferous Forest		
9c Dense Seral Lodgepole Forest	229	1.0
9F Old Growth Coniferous Forest	560	2.4
9 Other	10,126	42.6
10 Talus/Eroded Slopes	70	0.3
Islands (N=32)		
1c Marsh/Slough	3	tr
2 Gravel Bar	157	0.7
3 Sub-irrigated Grassland	3	tr
4 Deciduous Shrub Riparian	72	0.3
6 Mixed Deciduous/Coniferous Forest	64	0.3
9F Old Growth Coniferous Forest	8	tr
TOTAL	23,750	100.00

century perpetuated unique habitat features such as mountain shrub stands on the valley walls and open shrubland succeeded by dense stands of lodgepole pine (Pinus contorta) on benches along the river. This mosaic of riparian and forest habitats supported a diverse wildlife community.

There were no mitigation efforts to offset losses of wildlife habitat or loss and displacement of wildlife populations within the reservoir area during the construction phases of the project. Though wildlife considerations are incorporated into the forest plan and timber management plans on the adjacent Flathead National Forest, no terrestrial wildlife habitat management plans specifically designed to mitigate project losses have yet been undertaken.

In Phase I (Casey et al. 1984), a target species list was developed to identify the primary species impacted by the project (Table 2). Acreages of the major habitat types were mapped and quantified using aerial photographic interpretation (Table 1). For each target species, the area of critical habitat impacted by the project was determined. From these data and the literature, qualitative and quantitative loss estimates were estimated for each of those species.

The area inundated by the reservoir at full pool was considered the basis for the wildlife impact assessment. Because the hydroelectric generation at Hungry Horse and downstream dams require filling Hungry Horse reservoir to full pool, the impacts of the facility are attributed to hydroelectric generation. A summary of target wildlife species losses identified in Phase I is presented in Table 3 (modified from Casey et al. 1984: 55-56). As described in detail in the Methods Section, the target species losses have been converted to mitigation goals and are the basis for this mitigation plan.

Table 2. List of target species impacted by Hungry Horse Reservoir identified in Phase I (Casey et al. 1984)

Mammals

1) Big Game

Elk (Cervus elaphus)
Mule deer (Odocoileus hemionus)
White-tailed deer (O. virginianus)
Black bear (Ursus americanus)
Grizzly bear (U. arctos horribilus)
Mountain lion (Felis concolor)

2) Furbearers

Beaver (Castor canadensis)
Muskrat (Ondatra zibethica)
River otter (Lutra canadensis)
Pine marten (Martes americana)
Mink (Mustela vison)
Lynx (Lynx canadensis)
Bobcat (L. rufus)

Birds

1) Upland Game Birds

Ruffed grouse (Bonasa umbellus)
Blue grouse (Dendragapus obscurus)
Spruce (Franklin's) grouse (D. canadensis)

2) Waterfowl

Canada goose (Branta canadensis)
Mallard (Anas platyrhynchos)
Wood duck (Aix sponsa)
Barrow's goldeneye (Bucephala islandica)
Common goldeneye (B. clangula)
Common merganser (Mergus merganser)
Hooded merganser (Lophodytes cucullatus)
Harlequin duck (Histrionicus histrionicus)

3) Raptors

Bald eagle (Haliaeetus leucocephalus)
Osprey (Pandion haliaetus)

Table 3. Summary of loss estimates for target wildlife species impacted by the Hungry Horse hydroelectric project. Adopted from Phase I document (Casey et al. 1984).

Species (group)	Qualitative	Habitats Lost	Quantitative	
			# Animals	Acres of Key Habitat
Elk	High	Riparian and upland winter range	175	8,749 winter
Mule deer	Low	Spring (grassland) habitat and winter range	——	645 spring 3,844 winter
White-tailed deer	Moderate	Year-round habitat	——	——
Black bear	High	Year-round habitat (critical spring and fall foraging areas, denning sites)	36-45	22,994 total 5,585 riparian (denning, spring/fall) 5,713 upland shrubs (fall)
Grizzly bear	High	Year-round habitat (critical spring/fall foraging areas)	3-5	22,994 total 5,585 riparian (spring/fall) 5,713 upland shrubs (fall)
Mountain lion	Low	Year-round habitat for prey base deer,elk)	175 elk	8,749 elk winter range 3,844 mule deer winter range
Aquatic furbearers				
Beaver	Moderate-high	Year-round aquatic habitats (food resources, denning sites, foraging areas,	125	38.0 river miles and 34.3 tributary miles
Muskrat	Moderate		——	
River otter	Moderate		20-43	
Mink	Moderate			

Table 3. Continued

Species (group)	Qualitative	Habitats Lost	Quantitative # Animals	Quantitative Acres of Key Habitat
Waterfowl				
- Canada goose	Low			
- Mallard	Moderate		1,412	Nesting habitats (deciduous tree, riparian, deciduous shrub, riparian islands)
- Wood duck	Moderate	- Breeding, nesting and brood-rearing habitat		
- Barrow's goldeneye	Moderate			
- Common goldeney	Low		377	Brood-rearing (ponds, marsh, slough, grasslands)
- Common merganser	Moderate			
- Harlequin duck	Low-moderate			
Bald eagle	Moderate-high	Winter habitat	15 wintering	Not quantified
Osprey	Moderate (positive)	Increased nesting habitat		Not quantified
Terrestrial furbearers				
Pine marten	Low-moderate	Year-round habitat	—	14,542 conifer and mixed deciduous/coniferous forest stands
Lynx	Moderate	Dense lodgepole	—	229 dense seral lodgepole
Bobcat	Low	General habitat	—	—
Mountain grouse				
Ruffed grouse	High	Year-round habitat	—	518 deciduous shrub riparian 100 deciduous tree riparian 3,619 mixed deciduous/ coniferous forest
Blue grouse	Moderate	Breeding habitat	—	—
Spruce grouse	Moderate	Year-round habitat	—	10,923 coniferous forest

II. METHODS

A. MITIGATION OBJECTIVES

The quantitative and qualitative loss estimates described in the Hungry Horse impact assessment (Casey et al. 1984) were the basis for mitigation objectives. Because no wildlife mitigation has taken place for the Hungry Horse hydroelectric project, the estimated loss statements were directly converted into mitigation goals.

Quantitative loss estimates were usually expressed as numbers of animals impacted (i.e. 175 elk) and/or as acres of key habitats inundated. For these quantitative goals, the mitigation objective would be to replace either the animals lost through some type of habitat enhancement program or to "protect" key habitats equal in area to those key habitats lost. The term protection includes the acquisition of conservation easements or fee-title acquisitions.

B. DEVELOPMENT OF MITIGATION ALTERNATIVES

Many alternative mitigation projects were identified for their suitability and feasibility. Several factors were considered in this process. These included:

a) Benefits to the primary target species (highly impacted) and to endangered species;

b) Number of target species benefitted by implementation of an alternative;

c) Number of nontarget species benefitted by implementation of an alternative;

d) Consistency with the Montana Department of Fish, Wildlife and Parks (MDFWP) mitigation guidelines (Appendix A);

e) Consistency with the Northwest Power Planning Councils Columbia River Fish and Wildlife program;

f) Consistency with the Northwest Power Planning Council's draft criteria for land acquisition;

g) Consistency with Montana's long-range wildlife planning program;

h) Comments received during interagency coordination.

Emphasis was placed on those projects which could benefit the greatest number of target species and/or the most impacted species. Alternatives which encouraged the maintenance, enhancement or creation of structural habitat diversity (i.e. shrubfields, deciduous tree, deciduous-conifer habitats) and, hence, wildlife diversity were also preferred.

Comments, received during an interagency coordination meeting held 24 May 1984, indicated a preference for habitat enhancement projects (to increase carrying capacities). For those projects where enhancement opportunities were not feasible, it was decided long-range habitat protection and management programs would be appropriate.

To determine where mitigation should occur, the state's mitigation guidelines were used (Appendix A). These essentially set the following priority for locating enhancement or long-term habitat protection projects:

1) Lands currently owned or managed by entities other than the state on which mitigation projects are compatible with current land management policies (i.e. Forest Service lands allocated to wildlife management),

2) Lands for which long-term management agreements could be developed via agency agreements, conservation easements, etc.

3) Lands for acquisition by conservation easement or fee-title.

Additional criteria focused on distance from Hungry Horse Reservoir using the following priorities:

1) Immediate vicinity of the reservoir or within annual range of the species affected,

2) Within the county or within a 50-mile radius of the hydroelectric project,

3) Within the corresponding Department of Fish, Wildlife and Parks administrative region,

4) Within Montana.

C. CREDIT FOR MITIGATION ALTERNATIVES

The overall mitigation objective is to replace all of the losses of target species attributable to the Hungry Horse Dam project. This shall be accomplished, where possible, by intensively managing appropriate lands to increase the carrying capacity for the species. Numbers of animals present at the initiation of a mitigation project on lands selected for enhancement, do not contribute to replacement unless those animals are imminently jeopardized by a conflicting land use. Rather, replacement results from the increased carrying capacity and the associated production of "new" animals.

The degree to which carrying capacity can be increased is not known. Moreover, the potential will vary by species, present land use, habitat quality, and management intensity. No increases may be possible in some situations. For purposes of the analysis, it was assumed: 1) it is realistically possible to increase carrying capacity for all target species by one-third (0.33); 2) present densities are similar to those estimated for the Kootenai River Valley prior to impoundment; 3) replacement animals are the difference between the present density and a density value increased by one-third (0.33); and 4) the land area required to produce complete replacement of animal losses attributable to the Libby Dam project is calculated using the following equation:

$$X = A/C(0.33)$$

X = Unknown number of acres to be treated
A = Number of animals lost (target species goal)
C = Current density (animals/acre)

Each target species was evaluated, relative to those assumptions, to determine the degree to which reasonable mitigation measures will actually yield sufficient mitigation. Where acquisition by conservation easement or fee-title is specified, full credit on an acre-for-acre basis will be applied. Full credit would be applied because these lands would receive long-term protection from other detrimental impacts.

III. RESULTS

A. ELK/MULE DEER

1) Introduction

The principal impact of the Hungry Horse project was the significant loss of elk winter range (8749 acres) which included mule deer winter range (3844 acres), and the loss of mule deer/elk spring habitat (645 acres) (Table 3). Based on the carrying capacity of historical elk winter ranges (0.02 elk/acre), this represented a loss of 175 elk and an unknown number of mule deer (0.02 elk/acre x 8749 acres = 175 elk).

2) Mitigation Objective

- Quantitative:

  - Increase winter range carrying capacity by 175 elk via enhancement of 26,119 acres of winter range, and protection or creation of 645 acres of mule deer spring range,

-or-

  - Acquire 8,749 acres elk/mule deer winter range and 645 acres of mule deer spring range.

3) Mitigation Alternatives

To mitigate elk/mule deer winter range losses, one alternative would be to increase the carrying capacity of elk/mule deer winter ranges near Hungry Horse through various habitat enhancement and manipulation techniques. Alternatively, enhancement could take place elsewhere in northwest Montana. A third alternative is to protect 8749 acres of existing prime winter range through conservation easements or fee-title acquisitions. To mitigate spring range losses, the best alternative is to protect or create 645 acres of optimal spring-habitat types.

4) Recommended Alternative

The preferred mitigation project for elk and mule deer winter range losses is to implement a habitat enhancement program. This alternative is preferred because it replaces animals where they were impacted. In addition, this alternative would be more cost-effective than habitat acquisition.

This elk/mule deer winter range enhancement program would require long-term cooperative management agreements between land managing and wildlife agencies for the selected treatment areas. Long-term management agreements would extend for the life of the

Hungry Horse hydroelectric project and would include detailed habitat enhancement plans, retreatment schedules and monitoring requirements.

Depending on location and habitat characteristics of a winter range area, one of two enhancement approaches may be used. For winter ranges composed primarily of upland south and west aspects, the enhancement objective would be to create a mosaic of foraging areas (early successional stages) and cover areas (conifer cover). The reason for this approach is that significant proportions of these winter ranges have undergone plant succession due to fire suppression and have become dominated by various conifer forests. By increasing the foraging areas on these winter ranges (while also considering cover requirements), wildlife carrying capacities can be increased.

The second approach would apply to winter ranges located within or including riparian zones, creek bottoms, benchlands, foothills or kettle and kame topography. In these locations where snow accumulation is greatest, site-specific management plans might stress long-term maintenance of conifer cover necessary for thermal requirements in addition to the protection or enhancement of foraging areas.

Enhancement projects would take place within existing winter ranges either in proximity to Hungry Horse reservoir or within the Bob Marshall Wilderness Area. Selected winter ranges are listed by priority in Table 4. Winter ranges adjacent to Hungry Horse Reservoir are shown in Figure 2. The areas were prioritized based on relative importance of certain winter ranges and the need for enhancement. All proposed winter range enhancement projects would primarily benefit elk and mule deer with the exception of the Lion Hill project. This project would primarily benefit white-tailed deer in lieu of mule deer.

Treatment programs to be applied to these winter ranges would vary depending on site specific terrain characteristics, soil conditions, stand age and stocking rates, cover/forage ratios, wilderness or non-wilderness status, and many other considerations. Examples of treatments include prescription burns, thinning units, specialized slash treatments such as underburns and broadcast burns, creation of small cutting units, and cover maintenance.

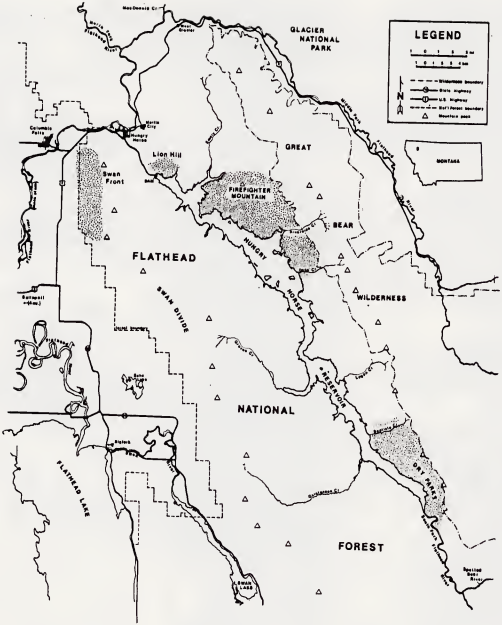
To mitigate spring habitat losses, the recommended alternative is to either protect or create 645 acres of optimal spring range habitat components in proximity to an elk winter range area. Protection or creation would entail obtaining a conservation easement or fee-title acquisition.

5) Mitigation Accounting

To meet the objective of increasing elk/mule winter range carrying capacity by 175 elk, a treatment acreage figure must be

Table 4. Ranking of elk/mule deer (or white-tailed deer) winter ranges near Hungry Horse Reservoir according to suitability and need for winter range enhancement.

Rank	Location Winter Range	Need For Enhancement	Potential Productivity
1	Firefighter Mtn. to Deep Creek	High (high % conifer cover)	High (historical winter range for elk, mule deer)
1	S. Fork Bob Marshall Wilderness	High (high % conifer encroachment)	High (important historical and existing winter range for elk, mule deer)
2	Swan Front	Moderate (undergoing conifer encroachment)	High (important historical and existing winter range for elk, mule deer)
2	Lion Hill	High to Moderate (high % conifer cover)	High (important historical winter range for elk, white-tailed deer)
3	Desert Mt. and foothills	Moderate (winter range along lowlands in need of protection; uplands have moderate % conifer encroachment)	Moderate to High (important winter range, but use is not well documented)
4	Dry Parks	Low to Moderate (dominated by shrub-fields with some encroachment lodgepole on Horse Ridge)	High (very important existing winter range)


GLACIER
NATIONAL
PARK
LEGEND
Wilderness Boundary
State Highway
U.S. Highway
Bull Moose Boundary
Meadow area
N
MONTANA
GREAT
BEAR
WILDERNESS
FIREFIGHTER
MOUNTAIN
Lion Hill
Swan
Front
FLATHEAD
NATIONAL
FOREST
SWAN RIVER
HUNGRY HORSE RES.
FLATHEAD LAKE
Kalispell
Columbia
Falls
Bigfork
Polson
Ronan
Dixon
Spotted
Bear
River
Gateway
Glacier
Park
Hungry
Horse
Dam
Swan
Lake
Flathead
Lake
Bull
River
Dam
Swan
Lake
Dam
Bull
River
Dam
Swan
River
Dam
Swan
River
Dam
Swan

calculated. Using the formula for increasing carrying capacity by 0.33 percent, the treated area would equal 26,119 acres. This number is based on increasing the estimated current elk density (0.02 elk/acre) by 0.33 percent or 0.0067 elk/acre. Each acre considered part of an elk/mule deer winter-range treatment program would be subtracted from the total goal of 26,119 acres until the goal is reached. Other target species habitat enhancement or protection projects which would benefit elk or mule deer (or white-tailed deer in lieu of mule deer) would be accounted for in this process, also.

The proposed winter range project would satisfy mitigation for both elk and mule deer winter range losses. It is anticipated mule deer spring range losses would be mitigated through other proposed habitat protection plans such as those described for black bear and grizzly bear.

6) Other Species Benefitted

Implementation of the preferred project would potentially benefit mountain lion, pine marten, bobcat, lynx, black bear, grizzly bear and mountain grouse.

B. BLACK BEAR/GRIZZLY BEAR

1) Introduction

Hungry Horse reservoir inundated 22,994 acres of black bear and grizzly bear habitat resulting in an estimated loss of 36 to 45 black bears and 3 to 5 grizzly bears. Key habitat types included 5585 acres of spring and fall foraging areas (i.e. sub-irrigated grasslands, deciduous tree riparian, mixed deciduous/coniferous forest, deciduous shrub riparian) and 5713 acres of upland shrub (Tables 1 and 3).

2) Mitigation Objectives

- Quantitative:

  - Increase carrying capacities of the remaining black bear and/or grizzly bear range by 36-45 black bears and 3-5 grizzlies through enhancement of 75,000 acres,

    -or-

  - Acquire 11,298 acres of key grizzly bear and black bear habitats.

3) Mitigation Alternatives

To increase the existing carrying capacity for black bears or grizzly bears by the desired quantity, approximately 75,000 acres would require treatment. The mean number of black bears or grizzly bears lost (4) was divided by the mean density estimates for that species multiplied by 0.33 (Methods Section II.C.). For black bear, the enhancement objective equaled 69,818 acres; for grizzly it equaled 80,679 acres. The average enhancement objective for the 2 species was 75,248 acres.

Potential locations for enhancement include public lands located within the vicinity of Hungry Horse Reservoir; public and private lands within the Northern Continental Divide Ecosystem as defined in the Grizzly Bear Recovery Plan (U.S. Dep. Inter. 1982); or within other grizzly and black bear ranges in Montana. Alternatively, 11,298 acres of prime grizzly bear and black bear habitat could be protected through conservation easements or fee-title acquisitions. These habitat protection projects could take place within the same areas listed above, but would focus on private lands.

4) Recommended Alternative

The recommended alternative for both black bear and grizzly bear mitigation is to protect existing important grizzly bear riparian habitat components and travel corridors. Emphasis has been placed on the grizzly bear because of its threatened status

(Endangered Species Act of 1973), its regional importance, and the current threats to its remaining habitat. Mitigation for grizzly bear would simultaneously mitigate for black bear. Habitat protection measures were selected because grizzly bears often come into conflict with private landowners, particularly in the spring. These human conflicts are considered more of a limiting factor to grizzlies than food or habitat (W. Brewster 1984, pers. commun.) In addition, protection of essential spring habitat and travel corridors on private lands is considered to be a priority project for grizzly bear recovery. (U.S. Dep. Inter. 1982:144).

Protection of these key habitats would occur through acquisition of conservation easements or fee-title acquisitions. Specific habitat components sought for protection would include floodplains, creek bottoms and wetlands, as well as those areas used by grizzly bears when traveling between various foraging areas and/or between subpopulations. The following areas (listed in Table 5) have been selected for the implementation of the conservation easement/fee-title acquisition program. These areas were identified using information obtained from MDFWP, Glacier National Park, and Flathead National Forest Service personnel; aerial photographic interpretation; research publications; and contacts with landowners. Additional areas may be identified through interagency coordination.

Criteria will be used to evaluate and select specific sites for conservation easement or fee-title acquisition during implementation of the mitigation project. These criteria include:

1) Quantity and quality of riparian foraging habitat types (i.e. sub-irrigated grasslands, deciduous shrub riparian, deciduous tree riparian, etc.);

2) Frequency of encounters with private landowners;

3) Proximity to known grizzly bear movement corridors and/or concentration areas;

4) Relationship to the U.S. Forest Service Wild and Scenic River acquisition program;

5) Susceptibility to subdivision or commercial development; and

6) Comments received during consultations and coordination with agencies and private landowners.

The recommended mitigation program would be implemented through cooperative agreements with the U.S. Forest Service which is presently administering the Wild and Scenic River program along both the North and Middle Forks of the Flathead River and the U.S. Fish and Wildlife Service, the agency responsible for administering the Endangered Species Act of 1973.

Table 5. Potential locations for acquisition of grizzly bear conservation easements or fee-title purchases in Flathead River System or Flathead Valley.

Specific Area	Reservoir (miles)	Town-ship	Range	Section(s)	Habitat Components/Types: Wetland	Habitat Components/Types: Riparian	Habitat Components/Types: Upland/Other	Mitigation Purpose/Objective
Hyack Flats (Middle Fork)	9	32N 31N 31N	18W 18W 17W	36 1	River/stream	Gravel Bar Subirrtigated grasslands Deciduous shrub riparian Deciduous tree riparian Mixed deciduous/ coniferous forest	Agricultural (hay meadows)	Protection of key Grizzly/black bear spring habitat and grizzly bear travel corridor.
West Glacier to Hangry Horse (Middle and North Fork)	4-11	32N 31N 31N 30N	19W 19W 20W 19W	34-35 2-4,7-12,14-15 17-22,26-30 31-34 1-2,12	River/stream Pond/lake Marsh/slough	Gravel bar Subirrigated grassland Deciduous shrub riparian Deciduous tree riparian	Dense seral lodgepole Old growth conifer Agricultural (hay meadows)	Protection of key grizzly/black bear spring habitats along floodplain and benchlands; Protection of grizzly travel corridors
Canada Border to Coal Banks (Upper North Fork)	20-50	34N 35N 36N 36N 37N	20W 21W 21W 21W 22W 22W	17-20,29-30 1,11,13,24 6-8,16-18 20-22,27-29 34-35 30-31 1-4,10-11,13 24-25,33 35-36 5,8-9,16,21-22, 25-29,33-36	River/stream Pond/lake Marsh/slough	Gravel bar Subirrigated grass-land Deciduous shrub riparian Deciduous tree riparian Mixed Deciduous/ coniferous	Terrace grassland Upland shrub Dense seral lodgepole Other Conifer Cutting units Pasture	Protection of key grizzly/black bear habitats along floodplain/ benchlands Protection of grizzly bear travel corridor
Swan Front (Flathead Valley)	8-10	30N 29N	20W 20W	14-15,22-23 27,34 3,10-11 14-15,22-23 25,36	Marsh/slough Pond/lake River/stream	Subirrigated grassland Riparian shrub Deciduous Tree Mixed deciduous/ conifer	Dense seral lodgepole Other conifer Old growth conifer Cutting units Pasture Agricultural land	Protection of key grizzly/black bear spring habitat
Swan Front (Swan Valley)		28N 27N 26N 26N	19W 19W 19W 18W	6,7,26-28 33-35 1-2,10-15 23-26 35-36 1,12 6-8 17-21	Marsh Pond/lake	Subirrigated Deciduous shrub riparian Deciduous tree riparian Mixed deciduous/ conifer forest	Upland shrub Coniferous Forest	Protection of key grizzly/black bear spring habitat

5) Mitigation Accounting

Accounting for the habitat protection program would be accomplished by summing the number of acres of riparian habitats or travel corridors protected by specific projects. This quantity will then be subtracted from the goal of 11,298 acres. The 11,298 acres represents 5,585 acres of riparian habitat and 5,713 acres of shrubfields inundated by the reservoir. Where a habitat enhancement project for another species, such as elk, benefits bears this treated area will be subtracted from the enhancement goal (75,000 acres) for bears. The number of bears requiring mitigation would be proportionately reduced using the formula described in Methods Section II.C. For other target species mitigation projects which result in protection of grizzly bear habitat (such as waterfowl), the 11,298 acre target will be reduced by the appropriate acreage.

6) Other Target Species Benefitted

The recommended mitigation plan for black bears and grizzly bears has the potential to meet a significant proportion of the mitigation goals for many other target and non-target species. Specifically, partial mitigation could be achieved for elk, mule deer, mountain lion, aquatic furbearers, terrestrial furbearers, mountain grouse, waterfowl, bald eagle, osprey, and many non-target species through the protection of habitats critical to these species (i.e. sub-irrigated grasslands, spruce bottoms, river banks, wetlands, etc.).

C. MOUNTAIN LION

1) Introduction

The impact of the Hungry Horse project on mountain lion was estimated to be low. The quantitative impacts were equivalent to the ungulate loss estimates as shown in Table 3.

2) Mitigation Objectives

- Quantitative:

  - Increase winter range carrying capacity by 175 elk,

-or-

  - Protect 8,749 acres of elk/mule deer winter range.

-or-

  - Protect or create 645 acres of mule deer spring range.

3. Mitigation Alternatives

The alternatives for mountain lion mitigation are the same as those for elk and mule deer: 1) increase the carrying capacity through long-term habitat enhancement program on 26,119 acres, or protect 8,749 acres of prime elk and mule deer winter range; and 2) Protect or create 645 acres of mule deer spring range.

4. Recommended Alternative

The recommended alternative is to enhance winter range for elk and mule deer through a long-term management program described for elk/mule deer mitigation.

5. Mitigation Accounting

Accounting would take place as described for the elk/mule deer recommended project alternative.

6. Other Target Species Benefitted

The target species benefitted would be the same as those described for elk/mule deer recommended alternative.

D. AQUATIC FURBEARERS

1) Introduction

Four aquatic furbearer species were moderately to highly impacted by the Hungry Horse hydroelectric project. Conservative quantitative loss estimates indicated a minimum of 125 beaver, 20-43 river otter and an unknown number of muskrat and mink (Table 3). Beaver loss estimates were based on an actual survey made in 1939 which indicated beaver were far below carrying capacity (Atwater 1939). By applying Atwater's carrying capacity estimates for the South Fork River and tributaries, Casey et al. (1984:37) calculated a potential carrying capacity loss of 565 beaver due to Hungry Horse Reservoir. The Hungry Horse project inundated a minimum of 2863 acres of critical aquatic furbearer habitat. The aquatic habitats represented 38.4 miles of river channel and a minimum of 34.3 miles of tributary streams.

2) Mitigation Objectives

- Quantitative:

Aquatic Furbearers:

- Increase carrying capacity for beaver by 125 and river otter by 20-43 through enhancement/management efforts;

-or-

- Protect 2863 acres of riverine and riparian habitats capable of supporting all 4 aquatic furbearers;

-or-

- Protect 38.4 river and 34.3 tributary miles of riparian habitat capable of supporting all 4 aquatic furbearers.

3) Mitigation Alternatives

Mitigation opportunities for aquatic furbearers include habitat enhancement projects along Hungry Horse Reservoir, habitat management and enhancement projects elsewhere in northwest Montana and habitat protection programs.

To determine if enhancement potential exists along Hungry Horse Reservoir, information is needed to determine the extent aquatic furbearers utilize the reservoir and associated tributaries. At present, such knowledge is lacking. Similarly, to develop aquatic furbearer management plans and guidelines or enhancement possibilities on river systems in northwest Montana, sufficient information on habitat requirements, food habits, population characteristics and distribution would be needed.

As an alternative to habitat enhancement and management opportunities, mitigation could be accomplished through habitat protection strategies (conservation easement/fee-title acquisition). The goal would be to protect 38.4 river miles and 34.3 stream miles which translates into a minimum of 2863 acres of aquatic and riparian habitat important to acquatic furbearers. These habitats include 702 acres of river/stream, 54 acres of Pond/lake, 144 acres of marsh/slough, 375 acres of gravel bars, 176 acres of sub-irrigated grasslands, 1005 acres of deciduous shrub riparian, 100 acres of deciduous tree riparian, and 307 acres on islands (Table 1).

4) Recommended Alternative

The recommended mitigation project would be to investigate and develop habitat management and enhancement opportunities for aquatic furbearers in northwestern Montana. The proposed project would primarily focus on river otter, although mink, muskrat and beaver would receive secondary attention. Mitigation for river otter is preferred for several reasons: 1) river otter habitat requirements are narrow and more restrictive than mink, beaver or muskrat; 2) it is a species dependent on running river systems and sensitive to habitat alterations; 3) it is a good indicator of quality habitat for other species; and 4) it is a species of special concern to the state because of its listing by the Commission on International Trade in Endangered Species Act (C.I.T.E.S. Act). In addition, it is likely mink, muskrat and beaver will be benefitted through waterfowl projects while river otter may not.

The recommended project would have 3 major objectives: 1) to assess the current status, distribution and habitat requirements of river otter in northwest Montana; 2) to identify current river otter and other aquatic furbearer enhancement and re-introduction opportunities on existing reservoirs and downstream habitats; and 3) to identify how impacts from future hydrological or other riparian developments on otter and aquatic furbearers can be mitigated.

5) Mitigation Accounting

No quantitative accounting procedure will be used for aquatic furbearer mitigation.

6) Other Species Benefited

Development of a management program for aquatic and riparian habitats for the benefit of aquatic furbearers will benefit many of the target and non-target and species which utilize these areas.

E. TERRESTRIAL FURBEARERS

1) Introduction

Terrestrial furbearers impacted by the Hungry Horse hydroelectric project were the bobcat, pine marten and lynx which suffered low, low to moderate and moderate impacts, respectively. Although the numbers of terrestrial furbearers lost could not be determined, pine marten lost a minimum of 14,542 acres of preferred forested habitats. The lynx lost at least 229 acres of dense seral lodgepole stands, an important cover type for its key prey species, the snowshoe hare (Lepus americanus). The impact on bobcat was the low-level loss of general suitable habitat.

2) Mitigation Goals

- Quantitative:

  - To protect or manage 14,542 acres of coniferous mixed forest for pine marten and 229 acres of seral lodgepole for lynx.

3) Mitigation Alternative

The major mitigation alternative for terrestrial furbearers would emphasize pine marten and, to a lesser degree, lynx. The pine marten's dependence on mature and/or old growth conifer forests makes long-term habitat protection and management the only feasible approach. Methods to achieve sufficient habitat protection include habitat acquisition (through conservation easement or fee-title purchase); development of long-range mature/old growth timber management plans on U.S. Forest Service lands adjacent to Hungry Horse Reservoir; or adoption of long-term mature/old growth management plans on public lands within northwest Montana.

For lynx, the mitigation alternatives include long-term maintenance of doghair lodgepole pine stands on lands adjacent to the reservoir or the permanent protection of this habitat type through conservation easements or fee-title acquisitions. In order to maximize the benefits to the lynx, a territorial species, the several seral lodgepole pine stands should be scattered throughout a large area.

Other recommended mitigation projects may partially mitigate terrestrial furbearer losses. For example, various elk/mule deer winter range enhancement plans may include long-term maintenance of mature or old growth timber for cover. In addition, habitat protection obtained through conservation easements or fee-title purchases for black bear/grizzly bear mitigation might contain

sufficient mature forest or old growth stands to support marten. Lands protected by easements or purchased could also contain doghair lodgepole stands, important for maintaining a lynx population.

4) Recommended Mitigation Project

The recommended project is to develop long-term protection and management plans for old growth forests in northwest Montana. Because the U.S. Forest Service has placed heavy emphasis on timber production near Hungry Horse Reservoir, it would not be feasible to propose blanket protection on 14,542 acres of old-growth and mature forests. In addition, much of the commercial forest near the reservoir either has been cut over or burned within the last 60-70 years. Finally, the issue of mature and old-growth forest management for wildlife species, partially or wholly dependent on its existence, extends across all forests in Montana. Therefore, the recommended project is to promote, develop and implement old growth forest management plans on private, state and federal forested lands in northwest Montana. This would be accomplished through coordination and consultation with private, state and federal land managers. Compensation for deferred timber sales may be a necessary part of the long-term plans.

At a minimum, the goal would be to develop a long-term, old-growth management plan on 14,542 acres of forested lands managed by private, state and/or federal entities. Protected forests would include a variety of habitat types, including flood plains, and incorporate tracts large enough to support marten and other selected old-growth indicator species.

Optimal old-growth management should occur on large planning units with a minimal size of 1,000 acres (McClelland 1979). Within the planning unit, 50 to 100 acre or larger tracts would be delineated and protected as old-growth dependent species such as pine marten (Hawley and Newby 1957) and pileated woodpecker (Dryocopus pileatus) (McClelland 1979, McClelland et al. 1979). Small openings of various sizes and shapes and seral stages (i.e. clear cuts) could be interspersed throughout the unit.

A potential location for development and implementation of the plans would be in the Swan River drainage. The Swan contains mixed ownership as well as a significant amount of old-growth which is rapidly diminishing. It is hoped implementation of an old-growth management plan in one or several locations would assist land managers to pursue similar plans elsewhere.

In addition to old-growth management for marten, the recommended terrestrial furbearer mitigations package should include long-term management for dense lodgepole pine stands on a minimum of 229 acres for lynx. This management could take place along the east side of Hungry Horse Reservoir where dense lodgepole stands are abundant. Present timber management plans for much of

the area call for thinning of these stands. Lynx management areas should be scattered to optimize the benefits to this territorial animal, but be large enough tracts to provide quality habitat for an abundance of snowshoe hares.

5) Mitigation Accounting

Each acre of mature old-growth forest included within a long-term old-growth management plan would be subtracted from the goal of 14,542 acres. Similarly, large tracts of contiguous old-growth or mature forest protected via a conservation easement or fee-title acquisition project would also be subtracted from the 14,542 acre goal. It may be possible to include old growth management areas within elk winter range enhancement/protection mitigation projects. When this occurs, the acreage would also be subtracted from the 14,542 acre target.

6) Other Target Species Benefitted

The implementation of the recommended project has the potential to benefit elk, white-tailed deer, mountain lion, black bear. It also would benefit important and/or rare old-growth depended species such as the barred owl, pileated woodpecker, and goshawk (*Accipter gentilis*).

F. MOUNTAIN GROUSE

1) Introduction

Construction of the Hungry Horse project resulted in high impacts to ruffed grouse populations and moderate impacts to blue and spruce grouse populations. Insufficient data were available to derive quantitative loss estimates. The high impacts to ruffed grouse were attributed to inundation of a minimum of 5262 acres of prime year-round habitat (3,619 acres of mixed deciduous/coniferous forest, 1077 acres of deciduous shrub riparian, 100 acres of deciduous tree riparian, and 466 acres of terrace grasslands) necessary for this species. The moderate impacts to blue grouse were based on loss of important lower slope and benchland breeding habitats (open coniferous forests). Spruce grouse were impacted by the inundation of 10,923 acres of coniferous habitats utilized by this species.

2) Mitigation Objectives

- Quantitative:

  - Enhancement of 5262 acres of optimal ruffed grouse habitat (deciduous riparian or other deciduous vegetation types).

3) Mitigation Alternatives

Alternatives for mountain grouse include increasing existing carrying capacities through habitat manipulations for each species or the long-term protection and management of existing productive habitats. Enhancement opportunities for all 3 grouse species do exist along the reservoir, upper South Fork River, and the Spotted Bear River. Habitat protection projects could also be applied along other portions of the Flathead River system or in northwest Montana.

4) Recommended Alternative

The recommended mitigation project for mountain grouse is to enhance habitat primarily for ruffed grouse through vegetation manipulation on lands adjacent to the reservoir. This project would be more cost effective than habitat protection or acquisition alternatives. Habitat manipulations for ruffed grouse would also benefit blue grouse. The ruffed grouse project was selected because impacts were greatest to this species and because it would simultaneously benefit blue grouse. In addition, spruce grouse habitat (coniferous forest) is not considered limiting in northwestern Montana.

Specifically, the proposed project would target 4,703 acres of habitat for ruffed/blue grouse management. Habitat manipula-

would take place on lower slopes, benches and creek bottoms which are conducive to creation and long-term management of aspen (Populus tremuloides) and birch (Betula spp.) stands. Hardwood stands provide important year-round habitat for ruffedgrouse and important breeding and brood-rearing habitat for blue grouse.

The proposed grouse enhancement project would require long-term cooperative agreements between the land managing and wildlife agencies for the selected treatment areas. The management agreements would extend for the life of the Hungry Horse hydroelectric project and would include detailed enhancement plans, retreatment schedules and monitoring requirements.

Other recommended mitigation projects such as the creation of aspen or birch habitats for elk/mule deer, may benefit ruffed or blue grouse as well. Protection of hardwood stands, sub-irrigated grasslands, and deciduous riparian shrub communities along rivers or creek bottoms through conservation easements or fee-title acquisitions would also benefit ruffed and blue grouse.

5) Mitigation Accounting

Each acre considered part of a long-term grouse habitat treatment program will be subtracted from the mitigation goal of 5262 acres. In addition, ruffed grouse habitat protected through conservation easement or fee-title acquisitions will be subtracted from the same overall acreage target. Aspen or birch stands created (or protected) through elk/mule deer winter range enhancement programs will also be applied on an acre for acre basis to the mitigation objective (5262 acres).

6) Other Target Species Benefitted

Creation or protection of aspen/birch communities will benefit elk, mule deer, white-tailed deer, black bear and grizzly bear, In addition, many non-target wildlife species will also be benefitted.

G. WATERFOWL

1) Introduction

Construction of the Hungry Horse hydroelectric project resulted in low to moderate impacts to several waterfowl species. Due to a lack of population data prior to construction, no quantitative population loss estimates were developed. Mallard losses were considered moderate because this species was the most common species breeding at beaver ponds (Atwater 1939). The wood duck, Barrow's goldeneye and common merganser also suffered moderate impacts due to loss of cavity-nesting habitat. The harlequin duck was given a low-moderate loss estimate because of its preference for swift-water habitats found along the South Fork tributaries. Canada goose and common goldeneye impacts were considered low primarily because of the estimated low populations that probably existed along the South Fork River.

Important waterfowl habitats inundated by the reservoir included 32 islands (comprising 307 acres), 1,005 acres of deciduous shrub, 100 acres of deciduous tree riparian, 176 acres of subirrigated grasslands, 147 acres of marshes and sloughes and 54 acres of lakes and ponds. These habitats (1,789 acres total) represented important nesting, as well as brood-rearing habitats for impacted waterfowl species (Table 3).

2) Mitigation Objectives

- Quantitative:

  - To protect prime waterfowl breeding and/or brood rearing habitat equivalent to calculated acreage of prime waterfowl habitats inundated by the Hungry Horse hydroelectric project.

3) Mitigation Alternatives

Enhancement opportunities for waterfowl could be undertaken at Hungry Horse Reservoir; however, these developments are not considered to be cost effective. Approximately 7 to 8 miles of gravel, mud and sand are exposed at the upper end of the reservoir during winter and spring due to reservoir drawdown. This upper region could be enhanced through extensive diking, island building and revegetation work; however, the tremendous fluctuations in the reservoir level makes building such structures a major undertaking. In addition, there is little natural brood habitat remaining in the reservoir area; this would have to be created if nesting habitats were enhanced. Additionally, ice often remains on the reservoir, particularly in the shallow bays, well into the breeding season. Thus, for several reasons, the benefits of enhancement efforts were considered marginal in relation to expense.

To offset waterfowl losses due to the Hungry Horse project, the preferred alternative would be to protect or enhance existing productive waterfowl habitats elsewhere in northwest Montana.

4) Recommended Alternative

The preferred alternative for waterfowl mitigation is to protect and/or enhance 1,508 acres of prime waterfowl habitat within the Flathead Valley and vicinity.

This targeted acreage was calculated by weighing and summing the acreages of waterfowl habitat inundated by the reservoir (Table 6). Prime habitats such as islands, pond/lake,marsh/slough and deciduous tree riparian were given a weight of 10. Deciduous shrub riparian and old-growth coniferous forest were given a weight of 5, while gravel bar was given a weight of 2. Acreages of each habitat were multiplied by the weight factor and summed to obtain total weighted acreage. The total weighted acreage was then divided by 10 to equal the acreage of prime waterfowl habitat requiring protection or enhancement within the Flathead Valley.

The Flathead Valley contains numerous wetlands, sloughs, rivers, creeks, lakes and potholes highly conducive to waterfowl production. Flathead Valley is currently undergoing extensive population and subdivision growth particularly near water. Subdivision impacts on wetlands include the removal of upland nesting cover, drainage, recreational disturbances, degraded water quality from septic systems and runoff, and introduction of domestic animals. Waterfowl production can be severely limited due to these impacts and disturbances. Many highly productive wetlands are also being drained for irrigation or for planting crops.

Through the acquisition of conservation easements and/or fee-title, existing or previously existing highly productive wetlands in the Flathead Valley can be protected or enhanced. The primary purpose of any private or public lands acquired (fee-title or conservation easement) or enhanced would be for waterfowl. Secondary considerations may be given to other target species benefitted such as aquatic furbearers or osprey. Protection strategies would include minimizing subdivision development, disallowing drainage or diversion possibilities, and limiting upland cover removal. Enhancement opportunities would include restoring natural drainage patterns, creating islands, increasing open water and/or emergent vegetation edge habitat, restoring upland cover, and minimizing disturbances during the nesting season.

Potential locations for waterfowl habitat protection and enhancement projects within the Flathead Valley have been identified through cooperation and coordination with the U.S. Fish and Wildlife Service (Table 7). These sites will be evaluated and ranked according to existing, as well as potential, waterfowl productivity using established criteria (Appendix B).

Table 6. Calculation of waterfowl acreage objective.

Nesting & Brood-rearing Habitats	Acres	x	Waterfowl Value	=	Total Weighted Acreage
Pond/Lake	54		10		540
Marsh/Slough	144		10		140
Gravel Bar	375		2		750
Subirrigated grassland	176		10		1,760
Deciduous shrub riparian	1,005		5		5,025
Deciduous tree reparian	100		10		1,000
Old growth coniferous forest	560		5		2,800
Islands	307		10		3,070
TOTAL	2,451				15,085/10

Acres of prime waterfowl habitat = 1,508.5

Table 7. Potential locations of waterfowl mitigation projects in Flathead Valley

Wetland Name/Area	Description	Township	Range	Section(s)
Potholes northwest of Kalispell	Group of potholes	29N	22W	14,15,22
Morning Slough	Pothole at base of Swan range	29N 30N	20W 20W	3 34
Drained wetland northwest of Kalispell	Drained pothole	29N 28N	22W 22W	33 3,4
McWenneger Slough	Oxbow Lake	29N 28N 28N	20W 20W 21W	31,32 6 1
Fairview Marsh	Large pothole	29N	20W	28,29,32,33
Old Steel Bridge	Remnant Marsh	28N	20W	11
Eagan Slough	Oxbow Lake	28N	20W	17-20,30
Church Slough	Oxbow Lake	28N	20W 21W	31 36
Robocker Ponds	Oxbow Ponds	28N	20W	29
Hodgeson Pond	Pothole	28N 27N	20W 20W	33 4
Smith Lake WPA Additions	Large lake and wetland	27N	22W	4,8,9, 17,18
Patrick Creek	Creek, marsh	27N	21W	10,11,15
Cooper's Slough	Old slough	27N	20W	13,14
Bethel potholes	Potholes	27N	20W 21W	6,7,18 12
Unknown Slough	Old slough	27N	20W	5,7,8,18
Cat Bay Wetland- (West side Flathead Lake)	Large marsh	23N	20W	3,10
Sandsmark WPA Additions (Ninepipe National Wildlife Refuge)	Potholes	19N	20W	16

Protection and enhancement of wetlands may also include the opportunity to increase the size of wetland areas already managed by the U.S. Fish and Wildlife Service. A key example would be to raise a dike a few feet on the Smith Lake Waterfowl Protection Area (WPA) located 10 miles west of Kalispell to increase the inundated area. Several enhancement projects such as incorporating water flow regulation structures and creating islands and upland nesting cover could be implemented to greatly increase waterfowl productivity. The U.S. Fish and Wildlife Service is currently developing the scope and potential of this alternative.

Because the Smith Lake project would most likely exceed the targeted acreage for Hungry Horse, implementation of this project would require combining waterfowl mitigation of Hungry Horse with the mitigation for other hydroelectric projects.

5. Mitigation Accounting

Each acre of prime waterfowl habitat protected through a conservation easement or fee-title acquisition would be subtracted from the 1508 acre goal. The same procedure would apply to the federally administered wetlands enlarged or enhanced.

6. Other Target Species Benefitted

Other target species which may be benefitted include aquatic furbearers (beaver, mink, muskrat), osprey, and bald eagle. Upland game birds, white-tailed deer and grizzly/black bears may also be benefitted depending on location of a conservation easement or fee-title acquisition.

H. BALD EAGLE/OSPREY

1) Introduction

Construction of the Hungry Horse project resulted in both positive and negative impacts to the federally endangered bald eagle and positive impacts to the osprey. An estimated 15 bald eagles traditionally utilized the South Fork for wintering due to the availability of open water and carrion. Because the reservoir freezes each winter eliminating foraging opportunities, impacts to wintering bald eagles were considered moderate to high (negative).

Little information was available to determine abundance of breeding bald eagles and osprey along the South Fork prior to construction of the reservoir. Because the reservoir currently offers suitable nesting habitat for at least 1 bald eagle pair and 8 osprey pairs (MDFWP unpublished files) impacts were considered negligible to nesting bald eagles and moderately positive to nesting osprey.

The effects of the Hungry Horse project on migrating bald eagles is somewhat complex. Following the introduction of kokanee salmon (Oncorhynchus nerka) into Flathead Lake in the early 1900's, spawning runs began up the mainstem of the Flathead River, the Middle Fork of the Flathead River and tributaries. Limited spawning apparently took place within the South Fork prior to construction of Hungry Horse Dam because of unsuitable substrate.

By the late 1930's spawning salmon began to attract significant numbers of bald eagles to the region during the fall. Relatively low numbers (a maximum average of 22) were noted in Glacier National Park between 1939 and 1948; however, numbers significantly increased following that time. The fall increase in bald eagles may be attributable to construction and operation of Hungry Horse Dam which enhanced the spawning habitat for salmon in the mainstem of the Flathead River due to warmer water releases from the reservoir. Because of this potential benefit and the fact bald eagles currently utilize the remaining portions of the South Fork and Hungry Horse Reservoir, it was estimated the Hungry Horse project resulted in low to moderate positive impacts on migrating bald eagle populations.

2) Mitigation Objectives

Season	Quantitative/Qualitative	Level of Effort
Bald Eagle		
Winter	Increase winter foraging by 15 eagles	Moderate-high
Breeding	Maintain or increase current level of breeding	Low
Migration	Maintain or enhance food supply during migration	Low-moderate
Osprey		
Breeding	Maintain suitable habitat	Low

3) Mitigation Alternatives

Bald Eagles:

Due to the freezing over of Hungry Horse Reservoir, little opportunity exists for enhancement of bald eagle wintering habitat adjacent to the reservoir. Therefore, this alternative was eliminated from the potential mitigation opportunities explored.

A second alternative is to protect and/or enhance perching and roosting habitats utilized by bald eagles during their fall migration through the Flathead River system. This could occur on both private and U.S. Forest Service lands along major spawning streams or river stretches. Key locations include the 4-mile stretch of the South Fork River below Hungry Horse Dam, the Flathead River between the confluence with the South Fork and Columbia Falls, and areas along Hungry Horse Reservoir. The U.S. Fish and Wildlife Service documented extensive bald eagle use of the 4-mile stretch of the South Fork River below Hungry Horse Dam during the fall migrations of 1982 and 1983 (U.S. Dep. Inter. 1983). Researchers, presently investigating salmon fishery on the Flathead River system, have counted between 20 and 40 eagles daily along the Flathead River between the South Fork confluence with the Flathead River and Columbia Falls during October and November (J. Fraley 1984, pers. commun.) In addition, bald eagles utilize the Hungry Horse Reservoir and upper South Fork River as alternative foraging areas to the salmon spawning streams during the migration period, particularly when salmon populations are low (B. McClelland 1984, pers. commun.) Eagles have been reported feeding on mountain whitefish (Prosopium williamsoni) which spawn in the upper South Fork during late October and November (B. McClelland 1984, pers. commun.).

Roost sites, used nocturnally and sometimes communally by migrating eagle populations, are also important. Eagles roost in sites which minimize thermal losses and, hence, energy expenditures. Such sites are usually located in mature or old-growth timber on slopes which drain cold air and/or above inversion layers (B. McClelland 1984, pers. commun.). They may also be located along the water courses. Little is known about roost site selection along Hungry Horse Reservoir or along other Flathead River systems except McDonald Creek in Glacier National Park and the lower South Fork below Hungry Horse Dam. The major roost sites in Glacier Park are located in upland old growth stands above Lake McDonald (B. McClelland 1984, pers. commun.). A similar upland site was used by bald eagles on Columbia Mountain above the lower South Fork (U.S. Dep. Inter. 1983).

Other alternatives for bald eagle mitigation would include the protection or enhancement of existing or historic nesting sites and habitat. Known active or historic nesting sites are located along the North Fork drainage, Hungry Horse Reservoir, Flathead River (mainstem), Flathead Lake and several of the large lakes located in and around the Flathead Valley. Many of these nest sites are being threatened by subdivision, logging and commercial developments. Eagle nests are most commonly located in mature or old-growth live trees containing strong support branches or forks (Evans 1983, Glinski 1983). Because nesting bald eagle populations may be expanding in Montana (D. Flath 1984, pers. commun.), such habitats in close proximity to waters with abundant food resources could also be targeted for protection.

The final group of mitigation alternatives would encompass improving fish and other prey populations. Enhancing fish habitats or populations within Hungry Horse Reservoir is not considered to be within the scope of this particular mitigation plan as these fisheries are being investigated in a separate project funded by Bonneville Power Administration (May and McMullin 1983). Should existing fisheries within the Hungry Horse Reservoir be significantly enhanced, this would benefit both eagle and osprey populations. Should other recommended wildlife mitigation plans for the Hungry Horse project enhance the year-round or seasonal bald eagle prey bases (i.e. carrion, waterfowl), these would be considered beneficial to bald eagle populations.

Osprey:

Because osprey do not winter in Montana and migrate prior to salmon spawning, the best opportunity for mitigation is to protect or enhance currently occupied osprey nesting habitat. This could take place along Hungry Horse Reservoir or the Flathead River system.

4) Recommended Alternative

For bald eagles, the preferred alternative is to undertake several projects that will benefit migrating, as well as nesting bald eagles. For migrating eagles, two tracts of private land between Hungry Horse Dam and Columbia Falls could be protected through conservation easements or fee-title acquisitions. In addition, once sufficient information is collected, bald eagle perch and roost sites along Hungry Horse reservoir can be protected. Protection could take place through cooperative management agreements between the U.S. Forest Service and wildlife management agencies.

For nesting bald eagles, the recommended alternative is to investigate and manage existing, as well as potential, nesting habitats along Hungry Horse Reservoir and in Flathead Valley. To undertake this project, investigations into nesting bald eagle activity and habitat utilization would have to occur. Following this research, cooperative management agreements between the U.S. Forest Service and wildlife management agencies could be developed to protect key nesting areas and habitats along Hungry Horse Reservoir. For nests located on private lands, protection could be obtained through conservation easements or fee-title acquisition.

No particular projects are recommended for osprey mitigation; it is anticipated that osprey nesting habitat will be protected through implementation of the recommended bald eagle nesting habitat project.

5) Mitigation Accounting

No mitigation accounting procedures have been developed. It is assumed 100% mitigation for loss of wintering bald eagle habitat will be offset through protection of nesting and roosting habitat along the reservoir and perch/roosting habitat below Hungry Horse Dam and along the Flathead River. It is also assumed implementation of the bald eagle project can sufficiently protect osprey nesting habitats.

6) Other Target Species Benefitted

Target species benefitted may include aquatic furbearers, waterfowl, and osprey.

IV. SUMMARY AND MITIGATION PLAN

Mitigation projects have been recommended for each of the target species or species groups impacted by the Hungry Horse hydroelectric project. All of the recommended projects will benefit more than 1 target species or species group. The mitigation accounting for each target species is shown in Table 8. Because specific acreages and actual schedules of mitigation projects are not presently known, anticipated benefits of each project are best estimates. Actual accounting credits will be determined as specific projects are proposed and implemented. The purposes of estimating credits were to illustrate accounting procedures and to preliminarily rank mitigation projects for schedule implementation.

The preliminary ranking for project implementation was calculated by first multiplying the estimated percent mitigation for each species (Table 8) by the qualitative impact level given to each species during Phase I (Casey et al. 1984). Highly impacted species were weighted as 3, moderately impacted species were weighted as 2 and low impacted species as 1. Averages of the qualitative impacts were used for species groups (i.e. aquatic furbearers). The bald eagle was given a value of 2 based on its endangered status. Resulting products were summed and the percent contribution of each project to the overall mitigation effort calculated (Fig. 3). The projects were then ranked on a scale of 1 to 3 according to their overall contribution.

The time-frame for project implementation for each priority level is as follows:

Priority	Time-Frame (years)
1	0-3
2	0-5
3	0-10

A summary of the resulting priorities, implementation schedule, maintenance requirements, and preliminary cost estimates (ranges) are presented in Table 9.

Table 8. Mitigation accounting, expressed as an estimated percent (%) of mitigation objectives, for projects included in the proposed mitigation plan.

Species/ Species group	Elk/Mule Deer Project	Black Bear/ Grizzly Bear Project	Aquatic Furbearer Project	Terrestrial Furbearer Project	Ruffed Grouse Project	Waterfowl Project	Bald Eagle Project	Total Mitigation
Elk	75	10	0	10	5	0	0	100
Mule Deer	85	10	0	0	5	0	0	100
White-tailed Deer	65	0	0	10	10	10	5	100
Black Bear	10	80	0	10	0	0	0	100
Grizzly Bear	10	90	0	0	0	0	0	100
Mountain Lion	73	7	0	8	7	3	2	100
Aquatic Fur-bearers	0	10	50	0	0	30	10	100
Terrestrial bearers	10	20	0	65	0	0	5	100
Mountain Grouse	10	20	0	0	60	0	10	100
Waterfowl	0	5	15	0	0	70	10	100
Bald Eagle/ Osprey	0	10	5	5	0	10	70	100

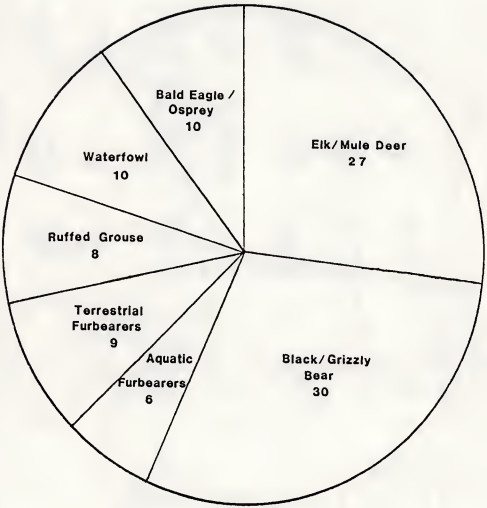


Figure 3. The percent (%) contribution of each recommended mitigation project to whole mitigation plan.

Table 9. Summary of implementation and maintenance schedules, locations, monitoring requirements for recommended mitigation projects for Hungry Horse hydroelectric project.

Project	Priority	Implementation Begin in (years)	Implementation End in (years)	Maintenance Schedule	Location(s)	Monitoring Requirements
Black bear/Grizzly Bear habitat protection (11,298 acres) conservation easement/ fee-title acquisition	1	0-3	10	Periodic for fee-title acquisitions	North Fork Middle Fork Swan Front	Annual monitoring required for easement property
Elk/Mule Deer-winter range enhancement (26,119 acres) and spring range protection/ creation (645 acres)	1	0-3	10	Periodic for life of project	Flathead National Forest	Retreatments required for enhancement projects
Bald Eagle/Osprey investigations; protection of habitat along South Fork and Middle Fork	2	0-5	5	None	Private Lands	Annual monitoring required for easement property
Waterfowl/ habitat protection/ enhancement (1508 acres)	2	0-5	10	Periodic for enhancement projects	Private lands U.S. Fish & Wildlife Service Lands	Annual monitoring required for easement property
Terrestrial Furbearers old growth forest management in northwest Montana (14,542 acres)	2	0-5	5	Periodic for life of project	Federal, State, Private lands	Periodic monitoring for modifications
Ruffed Grouse hardwood management (5262 acres)	3	0-10	5	Periodic for life of project	Flathead National Forest	Retreatments required for enhancement projects
Aquatic Furbearers	3	0-10	5	None	Private, Federal and State lands	

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MONTANA DEPARTMENT OF FISH, WILDLIFE, AND PARKS

MITIGATION GUIDELINES

When mitigation as provided by law is proposed for development projects, the Montana Department of Fish, Wildlife, and Parks shall request funding from the developer, or the appropriate agency, to conduct those studies necessary to determine impacts of the development on fish and wildlife and their habitat and to develop a project specific mitigation plan.

WILDLIFE SECTION

The principle objective of the mitigation plan shall be to mitigate within the project area impacts to wildlife and to compensate for animal losses attributable to the development project. The plan shall identify measures to maintain populations of affected species. The plan shall prescribe appropriate measures to document the implementation of the mitigation package, to monitor wildlife response to those measures, and to document the sufficiency of mitigation.

The Montana Department of Fish, Wildlife, and Parks shall request funding from the developer, or the appropriate agency, to implement, monitor, and document the mitigation measures prescribed in the mitigation plan.

Selection of mitigation measures for terrestrial species shall be determined by the following criteria:

A. The mitigation objective shall be to replace, on an animal for animal basis, animal losses attributable to the development project and to ensure the replacement of lost animal production into the future. This objective may be modified according to this priority:

   1. To replace, on an animal for animal basis, animal losses specifically attributable to the development project.

   2. To replace, on an animal for animal basis, some of the animal losses and an appropriate equivalent of animals of other species.

   3. To replace, on an animal for animal basis, an appropriate equivalent of other species.

B. Mitigation measures:

   1. The highest priority shall be assigned to the development and implementation of measures to enhance wildlife habitat on land owned by other agencies, corporations, or individuals, without the Department acquiring management authority to those lands.

      Implementation of enhancement measures shall be dependent upon cooperative agreements with the appropriate land management agencies and a land allocation compatible with mitigation objectives. The Department shall request funding for implementation of those measures, including operation and maintenance for

the life of the development project, and, when appropriate, research and development of enhancement measures.

2. If the Department cannot negotiate agreements to implement enhancement measures on lands in other ownership within a reasonable time, then the Department shall attempt to acquire management authority over lands identified in the mitigation plan. Acquisition of management authority by conservation easement, when applicable, shall have priority over acquisition by fee title from willing sellers. Lands to be acquired shall be determined by priorities established by this policy, while procedures for acquisition shall be consistent with principles outlined in the Department's statewide habitat acquisition policy. The Department shall develop a management plan for acquired lands. The Department shall request the developer, or the appropriate agency, to acquire the lands and to provide funding for development of the management plan, research and development appropriate to the management of those lands, and ongoing operation and maintenance of those lands.

3. On new projects, the Department shall request that mitigation lands be acquired at the same time as other project lands and be included in basic project costs.

C. The location of mitigation projects shall be consistent with the mitigation objectives, and be determined according to the following priority:

1. Immediate vicinity of the development project or within the annaul range of the species affected.

2. Within the county (or within a 50-mile radius) of the development project.

3. Within the corresponding Department of Fish, Wildlife, and Parks administrative region.

4. Within Montana.

D. Mitigation measures shall feature those species identified in Section A-1, 2 or 3, consistent with the mitigation objective. Those species shall have priority at all projects within location priorities Section C-1, 2, and 3. Thereafter, features species shall be determined by SCORP.

Decisions regarding acceptance or rejection of proposed mitigation recommendations shall be made with full public knowledge, input, and review.

Approved by:_____

Date:_____

Appendix B. Example wetland rating form.

WETLAND RATING SYSTEM

WETLAND NAME: _____ I.D. No. _____ DATE _____

LOCATION (general) _____ LEGAL T _____ R _____ S _____

DESCRIPTION (general) _____

TOPOGRAPHIC CONFIGURATION * _____

* 1 = slough
2 = oxbow lake
3 = pothole lake/pond
4 = artificial impdmnt.
5 =
6 =
7 =
8 =

CLASSIFICATION # _____

1 =
2 =
3 =
4 =
5 =

HABITAT DESCRIPTIONS

Upland types:	ACRES	% TOTAL	SPECIES COMPOSITION (dominant)

Wetland types:

RANKING CRITERIA: 3 = High 2 = Medium 1 = low

Upland Nesting Cover	_____	x (wt)	_____	= _____
Presence/No.islands	_____	x (wt)	_____	= _____
Emergent Nesting Cover	_____	x (wt)	_____	= _____
Brood Habitat Quality	_____	x (wt)	_____	= _____
Amount of open water	_____	x (wt)	_____	= _____
Open in winter	_____	x (wt)	_____	= _____
Vulnerability to draining/ developments	_____	x (wt)	_____	= _____
Edge (1)/ Area ratio	_____	x (wt)	_____	= _____
Other Target spp. benefited	_____	x (wt)	_____	= _____
_____	_____	x (wt)	_____	= _____
Total	_____	x (wt)	_____	= _____

PHOTOS:

COMMENTS/ SKETCH: